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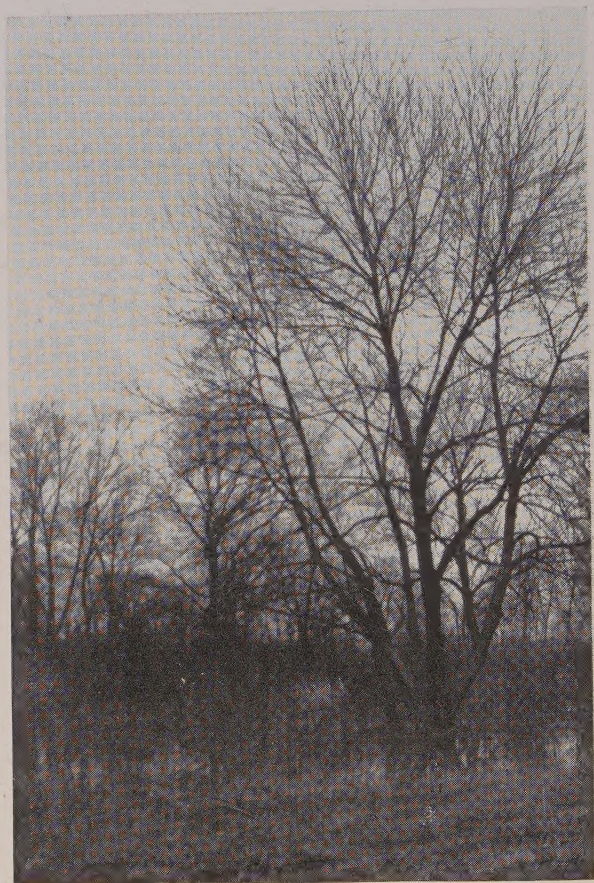
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November with bare branches against the sky.

Fall on Interpont

MARGARET MORSE NICE

Fall in Ohio is our golden season with its brilliant days, its flaming foliage, and the passage of the birds. Each month has its own splendor: September, gay with flowers and the chief migration; October, scarlet and gold, and glad with the songs of meadowlarks and song sparrows; November, austere beautiful with bare branches against the sky.

Between our house in Columbus and the Olentangy River stretched some forty acres of flood plain that had once been forested, then cultivated, and later largely abandoned. When we first came to Ohio, Interpont, as I called this intriguing place, was a tangle of vines and trees, weeds and bushes. Our garden was a jungle of burdock, while the dykes were crowned with forests of giant ragweeds towering above our heads. The fields were bright with goldenrod and asters, with here and there lady's-thumb and sunflowers and a bit of crimson morning glory.

In September, a few birds were still busy with offspring. Twice we were roundly scolded by indigo buntings, father bunting having molted into henry garb, but carrying insects in his bill. As late as October 3rd, a baby goldfinch was begging with madly fluttering wings. Mourning doves raised a September brood in the box elder next our house, the fledglings leaving the nest on the 24th and staying around our feeding station, tame and confiding, well into October. Once a song sparrow family left the nest the first week in September; these were great-grandchildren of Uno, the first song sparrow I ever banded and my favorite for the three seasons that he nested in our garden. Every autumn we heard insistent pleas from well-grown young cardinals, spoiled children, indulged by soft-hearted parents long after they were able to care for themselves.

September is the month of warblers. An avenue of giant ragweeds near an ancient sycamore by the river was a favorite place for these tantalizing creatures; this I called Warbler Way. One morning a large flock of black-throated greens in our garden made me suspect a "wave," so I hurried to the river where I was kept busy looking at new warblers until my arms ached from holding the glasses, but I counted a round dozen of species. Another thrill that morning was an osprey on the dead top of a sycamore across the river. I was not the only one excited; a pair of sparrow hawks flew over and about, repeatedly swooping at him, while flickers were stirred up, one even alighting on his back for a moment. Osprey in the meantime preened himself.

October is the crown of the year with the scarlet of the maples and poison ivy, the gold of the cottonwoods and willows, and singing

from many birds. Song at this season is doubly appreciated because of its unexpectedness. Our dependable songsters were song sparrows, fox sparrows and meadowlarks, but small tunes sometimes came from passing solitary vireos, while loveliest of all was the fairy music of ruby-crowned kinglet and winter wren.

Other birds have spring thoughts on balmy days in fall. My banded female cowbirds returned to their nesting grounds and were surrounded by vocal and bowing admirers. Bronzed grackles displayed to indifferent ladies, house wrens and English sparrows peered into boxes, while starlings visited holes and hollows, pulled out material and sang in proud ownership.

White-throated sparrows were our most abundant fall visitors. Many entered the large flat trap in the garden; at intervals I looked out from my study window, and when there appeared to be enough birds inside to repay the trouble of climbing down the bluff and back again, I pulled the string. One mild fall white-throats lingered long with us, some individuals for three to four weeks, although most of them seldom visited the traps. There was one misguided individual, however. Unknown to me, the trap had been pulled shut late one afternoon, perhaps by our dog, Rex; in the morning I discovered a most pitiful, bedraggled white-throat, its head bare from bumping against the top of the cage. Full of remorse, I quickly released it. Imagine my surprise to find it in the trap six times in the next five days!

One evening we were returning from a walk by the Olentangy. The sun had set, and all was silence. Suddenly there was an elaborate warbling strain from a young song sparrow while one or two white-throats started their evening speechifying—*tink tink tink*. A song sparrow followed suit with its metallic note. A bobwhite called; two mourning doves flew rapidly to the northeast, and two fox sparrows dashed past us, one in close pursuit of the other. Then the evening performance of *tinks* began in earnest from a little grove—*tink tink tink tink*—about one a second. This kept up with several birds calling constantly for seventeen minutes; then those in this particular spot stopped. For six more minutes birds at other points called, then all was quiet. While the racket was at its height, five or six of the exquisitely sweet songs had been given. It was a memorable experience—the soft reds and yellows of the trees and bushes, the yellow-greys of the grasses, and the evening song and strange talk of the white-throated sparrows.

In late October, Warbler Way became Sparrow Way. One afternoon I recorded six kinds of native sparrows in the weeds. Everywhere could be heard the scratching of dead leaves, the cracking of small seeds. Song sparrows and fox sparrows sang enchantingly. Bobwhites pattered about nearby; a flock of tufted tits flew across the river, two of

them sparring all the way, while a roly-poly pied-billed grebe contently rode down stream. A glint of light blue in the Olentangy made me look up; there on a leafy elm branch sat a kingfisher. Earlier in the month two males had had wild times rattling up and down the stream, chasing each other; now one ruled alone. The river banks were like a pageant with the reds and browns and yellows of the leaves in their own glory in the sunshine and a different glory reflected in the water.

In November, Interpont was still full of life. Rabbits scuttled through the bushes, squirrels robbed the feeding shelf, 'possums caught themselves in the traps. Bright colors left the weeds, but the beauty of form stood out as in an etching, emphasizing the grace of the golden-rod and grasses, the sturdiness of the giant ragweed.



Interpont was a tangle of vines and trees, weeds and bushes.

One bleak afternoon the weeds were full of birds, mostly of the finch tribe. Juncos were twittering and once or twice singing, as well as chasing one another. Song sparrows were everywhere; a few sang and several took baths! A tree sparrow followed suit, while others of his kind gave snatches of their pretty song. Unusual sparrows were a belated immature white-crown and two or three bright-colored swamp sparrows. A cock pheasant flew across the river like a comet in his gorgeousness and with his long, long tail. Three charming golden-crowned kinglets were in an old willow stub, as confiding as could be, flirting their little wings and chattering. They are so pretty with their bright crowns, so tiny, yet withal courageous, nesting far to the north and braving our winters.

And so was Interpont when we found it—a wild happy place for plants and birds and beasts. All this was changed. Many of the trees, and most of the shrubs, vines and weeds were cut down, plowed up

or burned. Interpont became but a shadow of its former self. Instead of a place abounding with life, there was desolation.

No longer could we watch the migration almost at our doorstep; no longer was there a chorus of October song. Few, indeed, were the fall visitors save for a scattering of faithful song sparrows, juncos, cardinals, and white-throats.

In later years, however, a partial compensation for the loss of the wealth and variety of wildlife came through a mighty roost, established by starlings and grackles, in mid-September in shade trees in town a half mile to the east of us. They were not welcomed here, but all efforts to discourage them proved fruitless.

I was rising early each morning to study the awakening song of 4M, the song sparrow that lived in our garden for eight years. A discovery awaited me: here were the winter constellations in all their glory the first of October — Orion and Auriga, Taurus and Canis Major, with their great stars, Betelgeuse and Rigel, Capella and Aldebaran, and the brightest of all, Sirius.

The earliest singers were roosters and I could not help thinking how fortunate we are that the chant of this barnyard bird is so musical. The crow of the pheasant is a pitiful excuse beside it. Black-crowned night herons quawked, and killdeer gave their sad cries. A young song sparrow began his pretty warbling while all the first magnitude stars still shone, but 4M waited until all were gone but Capella and Sirius. The sweet, high hymn of the white-throat, the rollicking song of the Carolina wren and the bubbling explosion of the house wren, as well as an occasional *cheer-cheer-cheer* from the cardinal—all these were heard before a clamor in the distance turned into a roar. The blackbirds were thinking it was time to rise. The roar continued and just as Sirius faded, out burst the first flock of starlings.

My notes for each minute from 6:26 to 6:36 (official sunrise) on the clear morning of October 9th read as follows:

"First flocks—starlings and a few grackles. More starlings. More starlings. More starlings, a few grackles. More starlings, many grackles. No one coming. Flocks of starlings; still the roar from the roost. *Immense flocks*, all grackles. A few flocks. Tremendous flocks of grackles, a few starlings."

Six minutes later, I wrote:

"Now they come, the last great exodus—starlings and grackles flying northwest. Still going, all grackles, or nearly all, flying north and northwest. Small flocks, no, *multitudes* of grackles and a few starlings. A few grackles have alighted in trees in our neighbors' grounds to the east and south. Silence from the roost."

In twenty-one minutes the site had been emptied.

The morning flights were exciting, but they were nothing to the spectacle in the evenings. The birds left the roost in many directions, but all seemed to return over Interpont. About a half hour before sunset the show began. Great flocks of one or both species flew rapidly overhead to the meeting place. Sometimes a group dropped down into the neighbors' trees; at first it was only grackles perching there and keeping up a constant chorus, but soon a company of starlings dove down to join them and I had hopes that a small roost might be established in our vicinity. But no, a sudden silence, as multitudes whirled off for their goal. As sunset neared, the cohorts increased. They came in clouds and armies that blackened the sky, and when we thought that all the blackbirds in Ohio must have passed over our heads, suddenly a new host appeared. At sunset the pageant ceased. All had assembled.

I thought of Edmund Selons' superb descriptions of the flocks of starlings in England. "Night after night I have watched them sail up, a sight of surpassing grandeur and interest—nay, of wonder too; morning after morning I have seen them burst forth from that dark spot, all joyous with their voices, in regular successive hurricanes—a thing to make the heart of all but Philistines rejoice exceedingly."

The Walker Prizes in Natural History, 1945

Essays on Mammals

The Boston Society of Natural History has announced the Walker Prizes for essays on mammals in 1945. Two prizes, founded by the late Dr. William Johnson Walker, are offered annually for the two most acceptable papers written in the English language on a subject chosen by the board of trustees of the society.

A prize of sixty dollars may be awarded to the author of the best essay. This award may be increased to one hundred dollars in the case of a paper of exceptional merit. A second prize of fifty dollars will be given only if the next best paper seems worthy of the distinction. No prize will be awarded unless the papers submitted are deemed worthy by the judges.

Competition for these prizes is not in any way restricted.

Each paper must be the result of original and unpublished research, personally conducted by the author, in complete form for publication, and submitted anonymously.

The closing date of this contest is May 1, 1945. For 1946 the subject is any subject in the field of insects.

Further details may be obtained from Miss Margaret Baker, Acting Secretary, Boston Society of Natural History, 234 Berkeley St., Boston 16, Mass.

Basement Herpetology

KARL P. SCHMIDT



This October, when it became necessary again to resume my duties as home furnace-man, the opening of the furnace door and the rattling of coal and shovel evoked a familiar rattling cry from a dark and moist corner of our basement. The voice was that of the swamp tree frog, the *Pseudacris triseriatus* of herpetologists, and we had not had this welcome winter visitor for some years. In 1936 and again in 1937 an individual frog of this species had taken up winter residence in our basement, and always replied to the noise of the coal and shovel. This fall we are especially favored, for a few days after hearing the first frog, a second responded from the opposite corner of the basement. What more pleasant winter sound, as a reminder of spring sure to follow, could there be for a lover of such small creatures?

As a matter of fact, every reasonably disorderly basement affords retreat to a variety of small insects and spiders as well as to the fluctuating populations of larger animals. The European house cricket, now widely naturalized in America, has appeared and disappeared at our home. A relative of the swamp tree frog, the common toad, might be expected as a not uncommon entrant into basements, since the cellarway serves as a pitfall, and an open door, or a crack beneath the door, would afford entry. In fact, however, we have only once observed a toad in our basement, a half-grown individual that lived in a crevice where the join of floor and wall is defective.

The most frequent of such autumn basement visitors, to judge from inquiries received at museums as to their identity, is the yellow-spotted tiger salamander, commonly referred to in this region, where true lizards are so few, as a "lizard." The tiger salamander spends the summer burrowing in garden soil or beneath boards or bark or other objects far from the marshes where the adults are to be found in great numbers in the spring. In the fall there is evidently a well-defined migration to the hibernating places, which appear to be either the marshes and ponds, or nearby situations. The wandering salamanders, forced to make their way around such houses as may lie in their path, are especially likely to fall into open cellarways.

A "herpetologist" is one who knows and studies amphibians and reptiles. He is quite likely to have specialized on the study of these creatures because they are to him altogether charming, although millions of his fellow men regard reptiles in general and even frogs and salamanders as the most repulsive of living things. It may therefore be a provision of poetic justice that the basement of a herpetologist's home should repeatedly have become the winter refuge of some of these creatures which are his familiars.

Trilobites

JOHN R. BALL

The geologic account of the slowly changing history of North America during long eons of time is a recital of interchange between lands and seas. Lands slowly subsided and seas swept in. Late in that indefinite time of our continent's early history seas existed in the western, north-central and south-eastern regions of the present continental mass. Great amounts of sand and mud were carried to these seas, were hardened into sandstones, shales and limestones. Subsequently through the great pressures of mountain building, and through infinite stretches of time, they were converted into quartzites, slates and marbles as they are today. Mountain building expelled the seas and the former sediments, now rocks, became a part of the dry lands, awaiting geological investigations.

The immense rock masses in today's mountains and lands, however, are strikingly devoid of much evidence of the life then existing. Careful recognition of all probabilities indicates, of course, that life existed in those remote ages. But hardened parts of animal matter, skeletons and shells, supporting and protecting that life either were not developed, or, if developed, have since vanished entirely by processes of solution, pressure and time. A few siliceous and calcitic fragments, found here and there, indicate that life really did exist. Accordingly, by many geologists that part of earth history is called the Proterozoic Era—the era of very early life.

Another passage of geologic time ensued, sediments again were eroded from the lands and piled in the seas. Then, or later, these sediments hardened into rocks, but the rocks so made have not existed long enough, nor have they been subjected to enough pressure to become quartzites and marbles as is generally true of Proterozoic rocks. They exist as sandstones, shales and limestones and many of them contain fossils in abundance. Knowledge is not withheld concerning the life which existed when these rocks were sediments. The earth has written its autobiography in stone, and the story of life which is told is that of the Paleozoic Era—the era of ancient life.

In the earliest full tide of this abounding life came the trilobites. Two facts lend great impressiveness to any written or spoken discussion of the trilobites: first, their early appearance and apparent dominance in the Paleozoic influx of life; second, their complete disappearance towards the end of that long passage of life, the Paleozoic Era. So far ahead of the rest of life's vast procession were the trilobites that for some hundreds of millions of years they stood practically alone. This possibly renders a somewhat negative meaning to the concept of "dominance."

But they lived, and living with them on the sea bottoms were protozoans, sponges, bryozoa and worms, not to mention others. And so, the presence of an abundance of trilobite fossils suggests that they did away with many contemporaries. They probably feasted on the quick and the dead as well as many primitive plants. They were both the scavengers and the carnivores of the early Paleozoic seas. Those seas presently became the home of giant mollusks and primitive fishes, and then the trilobites began to disappear. Possibly they met their enemies and were overcome.

TRILOBITE STRUCTURE

The trilobites were Crustaceans of the phylum Arthropoda, and they have been placed in a subclass, Trilobita. They were encased in a tough, leathery coating called chitin which was molted periodically as the creature grew. They were relatively small, averaging about two to three inches in length. Later in their day—after enemies appeared, possibly—some of them attained a length of more than two feet. They were elongate and bilaterally symmetrical, just as the worm and human being are bilaterally symmetrical.

Their symmetry was somewhat enhanced in the arrangement of their elongate bodies by the presence of a striking ridge in the center flanked by conspicuous lobes on each side of the axial elevation (Fig. 1-3). This arrangement gave them a lobate appearance and from that aspect comes their name: tri-lobate. The name "trilobite" was given as early as 1771, many years after the first description of a "flat-fish" had appeared, in 1698.

The trilobite fossil is tripartite in the transverse direction also. That makes it a common experience to find only about one-third of the entire carapace in the fossil condition. Either the head (cephalon), body (thorax), or the "tail" (pygidium) may come into the possession of the collector. These possibilities are still further restricted because the segments in the thorax (Fig. 2) are separable and less capable of withstanding commotion produced by waves and tides. So the thorax is quite rare as a fossil unit.

The presence of eyes and the strongly projecting lobes strengthening the elevated eyes (eye lobes) serve readily to distinguish the dorsal surface of the cephalon (Fig. 6). The segments of the thorax, few or many, in life were possessed each with a crawling or swimming appendage, but these in the fossil condition rarely are present, the thorax usually being quite thoroughly dismembered.

A solid, continuous condition in the pygidium, making it look much like the cephalon without the eye-lobes, is quite characteristic. But to call the posterior structure the "tail" is slightly misleading. The posterior third of the carapace, often found detached in the rocks, is really the protective covering of the abdomen.

Dr. P. E. Raymond of Harvard University, in this country an authority on trilobites, points out further a matter of great interest in the pygidia of the trilobites (see Raymond, 1939). Here was the growing point for the trilobites and increase in size was accomplished during the periodic molting periods. At these times growth took place near the tip of the pygidium, new secretion of the carapace provided for additional space, and new segments were released in the thorax just in front of the pygidium. These changes were similar to the conventional growing habits in all Arthropoda.



Fig. 1. *Calymene celebra* Raymond, an internal mold of a trilobite with a little of the original carapace clinging between the segments of the thorax. The pygidium is barely visible as it is turned downward almost at a right angle to the thorax.

Fig. 2. Drawing of the dorsal view of *Calymene celebra* Raymond. The thorax commonly contains thirteen segments. This fossil is very abundant in the Chicago region and formerly was known as *Calymene niagarensis*.

Fig. 3. A lateral sketch of *Calymene celebra* in the position of crawling or swimming. The segments of the thorax had very free interplay so that the creature could crawl or swim with an undulatory, up-and-down motion.

The preceding statements about trilobite structure suggest how readily one part of its body may have become separated from the rest of its anatomy. The trilobite carapaces have additional lines of weakness. In the lateral regions of the head a curved cleavage line is variously placed in the general region of the expanded portion of its

axial lobe, the glabella. The line of cleavage is called the facial suture; it is a vertical cut or groove through the carapace so that in molting, the head also could become tripartite. Figure 5 (a sketch of the photograph, Figure 4), shows how readily a fragment only of the cephalon may be left to constitute all there is of a fossil specimen. The spinal projections sketched in Figure 5 do not appear in the photograph of the specimen. The dashed lines of the sketch (purely diagrammatic) should show also the rounded provision for the eyes which surmounts the inner edge of the missing part of this cephalon, the free cheeks, so-called.

The molting habit thus made possible a still-further break-up of the carapace. The free cheeks may be lost, and that part of the cephalon which remains (Fig. 4) is called the cranidium. The cranidium, then, is the glabella of the trilobite and the fixed cheeks, which in the case of the photographed specimen, Figure 4, should have the projecting spines at the lateral corners (Fig. 5), but in this specimen only the basal portion of the spine on the left shows slightly in the photograph.

And so, amidst the multitude of the fossils in a rock, a free cheek, alone, looking like a miniature shoulder blade or a boomerang, may appear in the fossilized debris. And, of the many "spines" found in fossil fragments, some are the tips of cephalic or thoracic or pygidial spines.

THE GEOLOGIC ROLES OF THE TRILOBITES

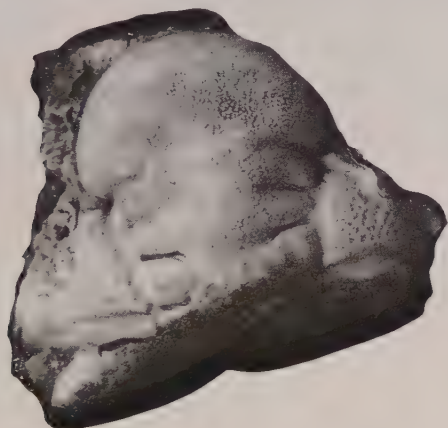
Interchanges of lands and seas continued on all continents during the Paleozoic Era. The trilobites were marine organisms and they found it possible to migrate wherever seas then existed. The result is that their fossils are widely distributed the world over. Geologists soon found that their fossils could be a factor in establishing correlations. Correlation is the important scientific contribution of geology in linking together in age separated outcrops of rocks. Several generations of fossils of trilobites showing that they lived together but traveled widely in their day became important witnesses in the pronouncements of correlation.

A time-honored example of this matching once served to establish the Lower, Middle and Upper division of the extensive Cambrian system of rocks in North America. The trilobite genera *Olenellus*, *Paradoxides* and *Dikelocephalus*, anywhere found in North America were thought sufficient to establish these divisions, Lower, Middle and Upper Cambrian, respectively. But today may be cited at least ten genera for the Lower Cambrian, twenty-five for the Middle, and nine or ten for the Upper, in addition to the three first named. These fossils are "index fossils" because their presence in a rock is an index of the age of that rock. While thousands of index fossils are becoming known to the commercial geologists, the trilobites still are among the leaders for the

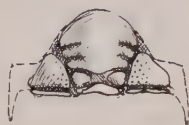
very early strata of the Paleozoic rocks because they appeared and were so widely distributed during those remote ages.

TRILOBITES AND ANCIENT INTERCONTINENTAL COMMUNICATIONS

In the task of restoring the details of ancient continents merely the ages of rocks is not the only consideration of scientific curiosity. Geologists, zoologists and oceanographers, to mention only three groups, are keenly interested in the locations of former shallow seas and intercontinental communication lanes. In belts and patches of ancient sedimentary rocks parallel to the present Pacific Coast, trilobite remains



4



5

Fig. 4. *Cheirurus niagarensis* (Hall), only the cephalon or head, with the free cheeks which bear the eyes missing from the specimen. In the left, lower corner of the photograph a portion of the genal spine (Fig. 5) and a fragment of the first thoracic segment are shown. The triangular pitted surfaces flanking the base of the glabella are the fixed cheeks. The expanded frontal lobe of the glabella is quite granulose.

Fig. 5. *Cheirurus niagarensis* (Hall). Diagrammatic sketch showing the extensions of the genal spines, forming what is commonly known as the "genal angles" of the cephalon. The genal angle may be a rounded corner including merely the space between the lateral and posterior margins of the cephalon. In this species it is prolonged into the sharply pointed spine.

in great abundance are gathered. These remains show a certain community of kinds, or genera, to use the more scientific word. The trilobite remains are seen to be of related forms whether the fossils came from Death Valley or from Eastern Manchuria. In other words, eastern Asia and western North America show trilobite genera which ranged in common through shallow Pacific seas. Thirty years ago discoveries were made which show that numerous trilobites found in China are of the same genera as those in the Cordillera of western North America or even in the Mississippi Valley.

Along the Atlantic seaboard, in the strata of the Appalachian Mountains the tracing of kindred species and of identical genera is possible. Related forms are in eastern North America, in the British Isles and in Europe. Trilobites migrated so far in the seas which swept these coasts that they became practically cosmopolitan. A famous Late Cambrian trilobite, *Dikelocephalus*, the "swallow-tail" trilobite, is traced all the way from Minnesota and Wisconsin into Wales. So minutely have some geologists mapped these migration lanes that one of them is thought to have extended eastward from North America across the British Isles and into Scandinavia. On the north side of that sea lane lived western North American trilobites, related Scottish trilobite genera and other primitive forms. On the south side of the same passage-way lived assemblages from eastern North America, Wales and Scandinavia.

These scientific possibilities of restoring the sea-ways for life in the ancient global configuration have been geologic gospel for the past hundred years. Almost 100 years ago, 1847, James Hall wrote in the preface of one of the volumes which since have become standardized authority for American Paleontology, the following calm and confident declaration: "We have a sufficient number of Trilobites, identical with those of the Lower Silurian (Ordovician) rocks of Europe to institute a comparison of the conditions of the ancient ocean in both hemispheres."

Both of the genera illustrated, *Cheirurus* (Fig. 4) and *Calymene* (Fig. 1), have participated in this "comparison." Both are index fossils of the Niagaran series of rocks, the rock which underlies Chicago and which is widely distributed elsewhere. Possibly not all of the claims made by earlier students for the age of these genera and for their distribution would be endorsed by modern students. This restriction would apply especially to the first of the two illustrated, but *Calymene* is still named along with more than a half-dozen other genera as very useful for intercontinental correlation.

NEAR AND DISTANT RELATIVES OF THE TRILOBITES

Leaving the alluring topics of correlation and intercontinental migrations, an equally fascinating subject comes to view. It comprises the subject of the affinities of the trilobites, ancient and modern. Scientific caution has to enter. Superficial resemblances, of course, can be recognized quite readily. But inasmuch as some of the closest resemblances to trilobites are among forms not even Crustacea, sufficient care must be exercised.

Living in Cambrian times with the trilobites were other Crustacea fully as ancient, which, until recently in scientific classification, have been assigned to the same subclass as the trilobites. They now are included in another subclass, the Agnostia. The name comes from the

generic name of *Agnostus* which was applied to a "trilobite" which was eyeless and which possessed only two thoracic segments. So closely do other Agnostia approach *Agnostus* in pattern that various prefixes, "eo," "pro" and "pseudo," are employed to name the comparatively newly described genera of the Agnostia. These other Crustacea very probably are the closest relatives to the trilobites. (See Shimer and Shrock, 1944).

The subclass Malacostraca is the subclass of the Crustacea containing the crabs, shrimps, lobsters and crayfish, creatures with which the trilobites most frequently are linked, possibly, in the textbooks. Nevertheless, no serious claim is advanced by any modern student for the role of ancestral crustacean to be played by the trilobites. However, it has been reported that certain unusual crab-like fossils have been interpreted as possibly ancient trilobites in which no exoskeleton (carapace) had appeared. (See Twenhofel and Shrock, 1935).

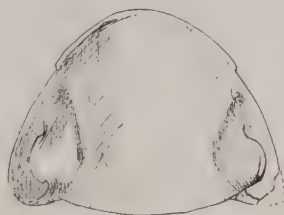


Fig. 6. *Bumastus insignis* (Hall). Sketch of the complete cephalon, with a slight portion of the genal angle on the right side missing in the original. In the sketch the facial sutures seem to pass outside the narrow, crescent-shaped eyes, but the suture really is the faintly impressed inner line lying on the strongly concave side of the eye.

The closest superficial resemblances, both fossil and modern, surprisingly have been found in the Arachnida, another class of the Arthropoda. Many of the Arachnida are possessed with strikingly trilobite-like cephalon on which there are several appendages. Several appendages are known to have been attached to the trilobite cephalon also. Many of the Arachnida have the segmented body, but in place of the abdominal shield they have a long spine, the telson, which is suggestive of the thoracic and pygidial spines in some genera of the Mesonacidae, a group of the trilobites in which, up to about five years ago, no trace of ventral appendages had been found. *Limulus*, the modern horseshoe crab, is a living Arachnid and with his huge cephalothorax and with his elevated and agitated telson, he bears quite a superficial resemblance to certain genera in the group of the Mesonacidae, named above.

Possibly, however, the remark made by Gilbert Raasch is the most pertinent here. Raasch says (See Raasch, 1939), freely quoted, that the several superficial similarities to be noted probably are as much due to the fact that the organisms are all Arthropoda, "primitive expression of their lines." Possibly, in checking over resemblances, this is about as far as one safely may go in seeking reasons.

TRILOBITES IN THE CHICAGO AREA

Calymene celebra Raymond (Fig. 1) and *Cheirurus niagarensis* (Hall) (Fig. 4) previously have been mentioned as prominent index fossils of Silurian rocks. *Bumastus insignis* (Hall) (Fig. 6, cephalon only) is another characteristic fossil of the Silurian rocks and of the Chicago region. It is also found in the Niagaran strata of the Mississippi Valley. *Bumastus*, along with *Illaenus*, *Isotelus* and *Dipleura*, is one of those interesting genera whose cephalon, minus the eye lobes and reversed in position, would serve almost equally well as a pygidium.

Dr. Stuart Weller, whose monograph on the trilobites of the Chicago region was one of the early Bulletins of the Chicago Academy of Sciences (Natural History Survey series, 1907) makes the statement that nearly forty percent of the then known Silurian trilobites of North America were represented in the Chicago area. This, he continues, is "the largest number of Silurian trilobites recognized from any area of similar size in America."

A catalog of the Silurian fossils which are in the Chicago Academy's Museum of Natural History shows that 224 specimens of the Museum's exhibits are trilobites. The species are distributed among 13 of the 47 genera of Silurian North American trilobites. These genera include all those today listed as the most common and the most important of Silurian genera. Among the species of the several genera are four which are marked merely as "sp." on the labels. This means that at least the species is possibly new to science and is awaiting published description.

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Sunday Afternoon Lectures - Fall, 1944

November 5

The Canadian Pacific Rockies

JOHN R. PHILP

World traveler, Lecturer—Chicago

Repeated from last season's series by
popular request.

November 12

The Grand Canyon Country

Kodachrome motion picture
with recorded music

VICTOR H. SICKINGER

Photographer—Wilmette

November 19

Our Heritage

The Northern Rockies

Kodachrome motion picture
with recorded music

NORMAN HALLOCK

Broadview Academy—La Grange

November 26

Out Where the West Begins

SAM CAMPBELL

"The Philosopher of the Forest"

Through the courtesy of the Chicago
and North Western Railway Company

December 3

Yellowstone National Park

Kodachrome motion picture

CARL P. RUSSELL, Ph.D.

Chief Naturalist, National Park Service

December 10

Idaho Wilderness

Kodachrome motion picture

KENNETH A. REID

Executive Director, Izaak Walton League
of America, Inc.

December 17

A Naturalist in the South Seas

KARL P. SCHMIDT

Chief Curator of Zoölogy,
Chicago Natural History Museum

Museum Activities

Sunday Afternoon Lectures - Fall, 1944

The fall series of Sunday Afternoon Lectures started November 5 and continues through December 17, 1944. These lectures are, as usual, free to the public, and non-members of the Academy are advised to arrive as soon as possible after the auditorium doors are opened at 2:15 P. M. The lectures begin promptly at three o'clock.

Because of the increasing popularity of these programs, attendance often exceeds the capacity of the auditorium. A section of the best seats is set aside for *Members of the Academy* and their guests. Only the number of seats reserved *in advance* is roped off. Therefore, please do not ask to be seated in this section unless you have made reservations by writing or telephoning the Academy office (LINcoln 0606) by noon of the Saturday preceding each program you wish to attend.

On arrival for a lecture, please *check* your reservations at the table in the lobby, where you will receive passes to the reserved section. In order to be as fair as possible to all members of the Academy, we must ask you to limit the number of reservations made on a single membership to *four* per lecture. We will, of course, do our best to accommodate larger parties under exceptional circumstances if arranged for in advance.

Illinois Audubon Lectures

The Illinois Audubon Society, in co-operation with the National Audubon Society, has scheduled an outstanding series of wildlife movie-lectures for the 1944-45 season.

On Saturday evening, October 7, C. A. (Bert) Harwell, western representative of the National Audubon Society, presented *Music of the Out-of-Doors* to a capacity audience. On Wednesday, November 15, at 8 o'clock John H. Storer showed his newest film, *Wings West from Florida*. Mr. Storer is especially noted for his closeup, slow-motion photography in color of birds in flight.

Mexico's New Volcano

On Tuesday evening, November 22, the Academy presented a special lecture, *Paricutin, a Volcanic Laboratory*, by Dr. Robert T. Hatt, director of the Cranbrook Institute of Science and president of the Midwest Museums Conference. The lecture, illustrated with kodachrome motion pictures and slides, was an account of the 1944 expedition, sponsored by Cranbrook and the University of Michigan under the leadership of the speaker, from Mexico City through Oaxaca and the famous archaeological areas to Mexico's spectacular new volcano.

Exhibits in Museum Lobby

From December into March the lobby will contain a display on *Camouflage in Nature*. Illustrative materials will include specimens and models from the Academy's collections, diagrammatic plates, "Experiments in Camouflage," loaned by the Institute of Design in Chicago, and—to show man's wartime application of principles of disguise learned from animals—ski troopers' and jungle fighters' outfits, shown through the courtesy of the Chicago Quartermasters Depot, U. S. Army.

Exhibit of Nature Photographs

The 1944 Nature Division Salon of the Photographic Society of America (Philadelphia) will be exhibited in the lobby of the Academy's museum during December. Concurrently, the photographs of the Pictorial Division will be shown at the museum of the Chicago Historical Society, Lincoln Park at Clark Street and North Avenue.

The Nature Division Salon consists of eighty-eight prints selected from about four hundred submitted by professional and amateur photographers in many parts of the country. Entries were judged by Roger Conant, William Bridges, Edwin Way Teale, John Reiner, Clark Getts and Charles E. Mohr.

Midwest Museums Conference

The Midwest Museums Conference held its annual meetings in Milwaukee, Wisconsin, on November 17 and 18. Host institutions were the Milwaukee Public Museum, Layton Art Gallery, Milwaukee Art Institute, and Milwaukee Zoo. The Academy was represented by Miss Harriet Smith and Dr. H. K. Gloyd, who is a member of the advisory council.

The Conference accepted an invitation, extended in behalf of the museums of Chicago by Dr. Gloyd and Dr. L. Hubbard Shattuck of the Chicago Historical Society, to hold its 1945 meetings in Chicago during the third week in October. This regional organization is sustained by museums in Michigan, Ohio, Indiana, Illinois, and Wisconsin.

Schools Study Weeds and Insects

Some two hundred of the commonest weeds of the Chicago Region were displayed in the Academy's auditorium as a special exhibit for the convenience of school classes. The Academy is deeply indebted to Anna Pedersen Kummer, honorary curator of botany, not only for lending this portion of her extensive weed collection but for setting up the exhibit.

Eighty-one school classes, totaling 2074 students, visited this weed exhibit as part of their fall program. Most of the groups also studied the permanent exhibits of insects on the third floor of the museum and requested a showing of color film on invertebrate life made by Academy field parties in Arizona. Thirty showings were given between September 25 and October 25.

Recent Visitors

Visitors from other museums and educational institutions during recent months included Dr. J. E. Ackert, dean of the graduate school, and Dr. E. H. Herrick, associate professor of zoölogy, Kansas State College, Manhattan; A. F. Ganier, editor of *The Migrant* (Tennessee Ornithological Society), Nashville; the Rev. F. S. Dayton, director of the New London (Wisconsin) Public Museum; Miss Viola S. Schantz, U. S. Fish and Wildlife Service, Washington, D. C.; Arthur M. Greenhall, director of the Portland (Oregon) Zoo; E. G. Wright, director of the Neville Public Museum, Green Bay, Wisconsin.

The Naturalist's Book Shelf

MANY HAPPY DAYS I'VE SQUANDERED

By Arthur Loveridge

Harper and Brothers, New York, 1944, viii,
278 pages, 19 photographs. \$2.75.

When a book results from a single expedition by a wide-eyed traveler, it's just another book. When an acknowledged authority takes a postman's holiday from research to write entertainingly of animals, as familiar to him as your dog is to you, it's news.

From such innocuous creatures of the English countryside as a jackdaw, which perched on his bald, infant pate, and a fox, with a penchant for strawberry jam and chocolates—further evidence that foxes are smart—Arthur Loveridge traces his progress to eventual intimacy with spitting cobras, driver ants, pancake tortoises, and sundry other inhabitants of Tanganyika Territory. Those who have known the aardvark chiefly as a catchword in crossword puzzles will enjoy seeing its portrait, and will be amazed to learn that a club blow, powerful enough to kill a man, is only a minor annoyance to the thick-skulled "earth pig." American owners of homes damaged by termites will applaud the African custom of mixing pulverized termite nests and water to make cementlike floors.

During World War I, while serving in the East African Mounted Rifles, the author proved that a snake-catcher was a handy man to have around, in an area where snakes were unusually addicted to bundling. Although involved in hard fighting on various occasions, Loveridge treats these engagements as annoying interruptions of his zoological pursuits; his account of a column of soldiers being routed by the aggressive wild honey bee is more graphic than his references to fighting behind the German lines. The V-mail

of every present-day museum curator testifies that even global war affords similar opportunities for animal collecting. One wonders, however, if any modern G. I. will equal Trooper Loveridge's achievement of persuading a general to lend his car for salvaging some pickled snakes, assembled by a dispossessed German veterinarian!

The stories debunking animals, which have become so fashionable in recent decades, have done much to dispel the wholesome respect which an earlier generation, steeped in the vivid "Man-Eaters of Tsavo," had for the king of beasts. Many persons now have the general conviction that only crotchety old lions, badly in need of dentures, so far forget themselves as to forsake gamy zebras for human flesh. Loveridge's calm statement that "approximately two hundred natives were killed by lions" in Tanganyika during his last year as Assistant Game Warden there, will jolt such readers out of their chairs. In fact, the gruesome catalogue of actual man-eating incidents which came to his personal attention makes absorbing postprandial reading.

Arthur Loveridge is now the Curator of Reptiles and Amphibians in Harvard's Museum of Comparative Zoology, but he is no mere "cabinet naturalist," for he returns to Africa to continue his collecting every fourth year. While there he may occasionally "squander?" a day by observing animals without collecting them, but he certainly does not "squander" any days during the sedentary interim years in Cambridge, for his scientific productivity is the envy of other herpetologists.

M. Graham Netting

Reprinted, with permission, from *The Carnegie Magazine*, vol. 18, no. 4, p. 115-116.

THE MAMMALS OF EASTERN UNITED STATES

By W. J. Hamilton, Jr.

Comstock Publishing Company, Inc., Ithaca, New York, 1943. 432 pages, 184 figures. \$4.00.

This is the second volume in a series of handbooks of American natural history published by the Comstock Press, the first volume being an account of frogs and toads by A. A. and A. H. Wright, and the third a handbook of salamanders by Sherman C. Bishop. If additional handbooks fulfill their purpose as satisfactorily as these first three volumes have achieved theirs, the publishers will have performed a real service to amateur and professional biologists. It is to be hoped that this series will not stop with these three books, but will continue through birds, fishes, and invertebrate phyla. These latter are especially desirable, and at least ten such handbooks covering insects would be a lasting monument to education.

With respect to the handbook of mammals, the reviewer approaches his task from a general background of professional zoology. Not being a mammalogist he is unable to give a critical appraisal of the numerous special descriptions of animals contained in this book, or to evaluate the several problems in the subspeciation of mammals. These are special things best handled by specialists in this or that particular group. On the other hand, the reviewer has had occasion to collect mammals from Panama to northern Wisconsin, and from Ohio to Colorado, to instruct his students in field zoology in the preparation of study skins and the examination of stomach contents, and has been impressed by the great interest of people in the life-history and species ecology of even the most familiar mammals. This general interest needs literature to partially allay its thirst for exact information and the present handbook by Hamilton should serve in this respect.

The preface opens with the objective clearly stated: "The present volume is

intended to give brief descriptions and accounts of the distribution and habits of all the present day land mammals naturally inhabiting the states east of the Mississippi River. It is designed for students of mammalogy and for the increasing number of laymen who are interested in this important aspect of wild life."

The opening chapter, of nine pages, introduces certain general features in the distribution, coloration and collecting of mammals. This is followed by an efficient, one-page key to the eight orders of mammals of the eastern United States. The key characters are practical, requiring a minimum of special biological background, and each order is followed by a page reference to an appropriate chapter.

The next eight chapters, therefore, take up the eight orders of mammals noted, namely Marsupialia, Chiroptera, Artiodactyla, Lagomorpha, Rodentia, Carnivora, Insectivora and Xenarthra. These chapters comprise nearly the entire book (400 pages), and cover in an interesting, yet necessarily abbreviated form 253 species and subspecies east of the Mississippi River. These chapters have a similar organization, starting with the definition of an order, and followed by a key, to families in the case of the large order of rodents, or to genera in the other instances. The families of rodents are briefly defined, and each keyed to genera. As a rule genera are not defined beyond the key characters. Each genus is given a page reference but the species and subspecies are not keyed out. These lower taxonomic categories are each taken up in sufficient detail to allow one to objectively identify a specimen in most instances. For example, the reviewer had no difficulty in checking the book against study skins of Virginia opossum, prairie mole, red fox, least weasel, southern woodchuck, eastern flying squirrel, southeastern flying squirrel, and common muskrat. Since the primary keys to genera place great emphasis on dentition, the subject should have been

given a special treatment in the introductory chapter, but this can be obtained in many texts on anatomy or even texts of general zoölogy. If Professor Hamilton's book is revised in a later edition the dental formula, tooth characteristics and appropriate illustrations could be gathered in such a way that the uninformed but enthusiastic layman is oriented for the study of his material before the keys are to be used.

We were pleasantly impressed with the amount of simple natural history incorporated in the species descriptions, and with the realistic drawings of E. L. Poole. The simple and up to date distributional maps were the most salutary feature for the reviewer. These should be a real help to ecologists in zoögeographic studies, as well as a direct aid in identification of mammals.

These eight chapters are followed by a topical bibliography which covers general references, anatomy, check list, localities by states, taxonomic revisions by orders, and life histories by orders. The volume closes with an index to the taxonomic units covered in the book, both by scientific and common names. It would be greatly improved by cross-references to habits, life-history events, activity periodism, food and other ecological categories.

In closing this review it should be repeated that the reviewer has found Dr. Hamilton's book very readable, well illustrated and of attractive format. It should make a contribution to our literature on natural history.

Orlando Park

THE GRASSHOPPER BOOK

By Wilfrid S. Bronson

Harcourt, Brace and Company, New York, 1943.
127 pages, numerous drawings by the author.
Cloth, \$1.75.

"When I was a boy in Illinois—" these are the beginning words of this fascinating book. Those very words almost compel one to read further because they bring up childhood memo-

ries which each one of us treasures.

Mr. Bronson has written ten chapters, five of which are about grasshoppers and five about the grasshoppers' relatives. In his treatment of the grasshoppers themselves, he writes of their "machinery" which is a less imposing word for "anatomy"; then he describes the insects' growth, how plagues come about, and finally, he tells of eight or ten kinds of grasshoppers.

In chapters six and seven come the katydids and crickets. The inclusion of roaches in chapter eight is a surprise to many readers. The walking sticks and praying mantises comprise the last two chapters.

The book is illustrated in an excellent manner with realistic sketches—not of "just specimens" but of the insects "in action." The text is free of errors and the pages are easy to read. It is one of those delightful and "comfortable" books to read, and when one has finished it, one knows a lot more about Orthoptera, unless he might have been a specialist in this particular field. Mr. Bronson is to be congratulated on packing so much information into 127 pages—information that is accurate and interesting.

W. F. Henderson

THE EARTH AND MAN

By Darrell Haug Davis

The Macmillan Co., New York, 1942, xxiii, 675 pages, 80-page appendix, 452 figures including maps and charts, numerous halftones and line drawings, index. Cloth, \$4.25.

The Earth and Man, designed as a textbook in college geography, serves as an excellent summary of the principles and problems of human ecology—those problems which are largely responsible for the present world conflict and which will be the primary concern of the post-war period.

The four parts of the book and its appendix have the scope: *I. Introduction* (the growth of geographic knowledge and mapping); *II. Man and Environment* (including man's use and misuse of natural

resources); *III. Limiting Effects of Environmental Factors*; *IV. How Man Obtains His Livelihood* (the environmental basis of man's economic activities); and *Appendix* (methods of map projection, land surveys, weather prediction, climate and soil classification).

In the words of the author, who is head of the department of geography at the University of Minnesota, "The book is not . . . a compendium of geographic knowledge but a . . . selection . . . emphasizing how and why man's visible impress on the earth's surface, as manifested by his works, is affected by natural and regional inheritance. . . . It is conceived that man cannot 'conquer nature' but that he exists by her sufferance, succeeding only insofar as he regulates his activities to profit from such opportunity as may be presented."

Harriet M. Smith

PHOTOGRAPHY ITS PRINCIPLES AND PRACTISE

By C. B. Neblette

D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, 1942, xii, 865 pages, 394 figures, Cloth, \$7.50.

The fourth edition of this standard reference book deals exhaustively with the entire field of photography, including the several color processes which have become widely used during recent years. It explains basic principles of physics and chemistry as applied to photography and gives in detail practical methods and formulas which have been proved successful. It describes cameras, lenses, light sources, accessories, apparatus for processing, and many other items of equipment. The advanced amateur or professional who does not already own this book will find it an investment that will yield more than satisfactory dividends.

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The Chicago Academy of Sciences
announces the publication of
Mushrooms of the Great Lakes Region

By
VERNE O. GRAHAM, PH. D.
*Honorary Curator of Mycology
Chicago Academy of Sciences*

A manual of the fleshy, leathery and woody fungi of Illinois, Indiana, Ohio, and the southern half of Wisconsin and of Michigan.

For the amateur as well as the professional naturalist, this book is intended to furnish means for identifying the species of Ascomycetes and Basidiomycetes of the area covered. A key to genera is followed by a systematic treatment of more than 1200 species. There are keys to the species of all larger genera. Each species is characterized briefly and its habitat and geographic range stated. *Those of known edibility are indicated.* Descriptive terms are defined in a glossary and scientific names, including synonyms, are indexed.

The illustrations, 868 figures in 49 plates, were carefully drawn under the supervision of the author and handsomely printed by collotype.

Published jointly by the Academy and the
Chicago Natural History Museum (formerly
Field Museum), vii + 390 pages, 49 plates,
paper cover, June, 1944. Price \$4.10 post-
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